

**SN: 043-0028**

# **Bridge Condition Report**

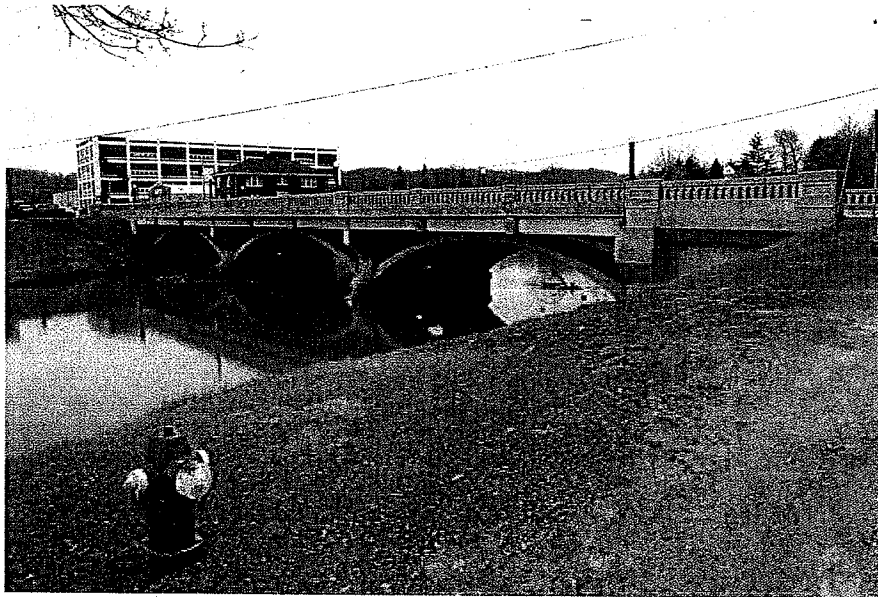
**DISTRICT: 2**

**ROUTE: F.A. ROUTE 18 (IL. 84)**

**SECTION: 103-D-BR**

**COUNTY: JODAVIESS**

**STRUCTURE NUMBER: 043-0028**



**LOCATION: WITHIN HANOVER**

**PREPARED BY: Rich Mardauss**

**DATE PREPARED: December 4, 2008**

**PROPOSED LETTING DATE:**

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## **I. Geographical & Administrative Data:**

**Structure Number:** 043-0028  
**County:** JoDaviess  
**Route Carried:** IL. 84  
**Feature Crossed:** Apple River  
**Section:** 103-D-BR  
**Station:** 259+08.20

**Roadway Classification:**  
**Design/Posted Speed:** 30/30 MPH  
**ADT (current/design):** 3300/4750  
**ADTT (current/design):** 264/380  
**DHV:** 330  
**Inventory Rating HS:** 12.1  
**Operating Rating HS:** 25.0  
**Sufficiency Rating:** 23.4

### **Construction / Reconstruction / Repair History**

The original bridge, which was a three span spandrel arch, was built in 1933 as SBI 80, Section 103-D. It was 209.66 feet long from back to back of the abutments and 38 feet wide out to out. The deck accommodated two, 12 foot wide traffic lanes and two 6 foot wide sidewalks.

In 1983, the structure was rehabilitated as FA 18, Section 103-D-BR. Under this contract, the concrete deck was removed, the abutment and pier caps were widened, and PPC box beams were set in place to form a new and wider superstructure. Even though all external loads were removed from the arches during reconstruction, all six arches were left in place for aesthetic effect.

In 1990 the bituminous wearing surface was removed and replaced with a 5 inch thick concrete overlay. In addition, neoprene expansion joints were installed over all four substructure units. This work was included within resurfacing contract FA 18, Section 104RS-3.

## **II. Physical Description of Structure:**

The superstructure of this 3 span bridge is composed of PPC deck beams. All three spans are simply supported, and each span is approximately 69 feet long. The out to out width of the deck is 43.83 feet which includes two 15 foot wide traffic lanes, two 5.92 foot wide sidewalks, and two 1 foot wide parapets. The bridge has no skew, and its centerline is a straight line which is tangent to the 1.66 degree horizontal curve which defines the centerline of IL. 84. This curve is relatively flat with respect to the structure. If a chord line is drawn from abutment to abutment at points where the striping curve intersects the backs of the abutments, the chord offset at the center of the bridge is only 1.65 feet.

The abutments and both piers are built on spread footings keyed into rock. The piers are solid from bedrock to the bottoms of the arches, and the abutments are closed with 36 foot long curtain walls.

The bridge deck slopes from north to south at an imperceptible rate of .04%. The only utility on the bridge is an electrical line for the ornate lamp posts.

### **III. Field Inspection & Physical Evaluation:**

#### **Superstructure:**

**Deck:** There are no spalls or delaminations in the concrete wearing surface, but reflective cracking has occurred over 11 of the 13 keyways.

**P/S Box Beams:** The entire soffit (8800 square feet) was sounded and 10 spalls (totaling 6.25 square feet) were found. Although no tendons are exposed, and stirrup exposure totals less than one tenth of one percent of the entire soffit area, the superstructure has to be rated 4 by current rating criteria. See the graphics in the latest damage inspection for spall dimensions and locations.

#### **Substructure:**

**Abutments:** Both abutments are in good condition. According to the latest PONTIS inspection, only one percent of the total abutment area is unsound.

**Piers:** Both piers are also in good condition, and there is no bar exposure anywhere. Seven percent of the total pier surface area is unsound due to superficial scaling.

#### **Inspection History (NBIS Ratings):**

Year	Deck	Super	Sub
2008	4	4	6
2007	4	4	6
2006	6	4	6
2005	6	6	6

### **IV. Potential Scope of Work Determination & Analysis:**

#### **Option 1: Remove the existing superstructure and replace it in kind.**

There is 40 inches of clearance between the existing PGL and the tops of the original concrete arches. The current superstructure is 38 inches deep, and the bottoms of the deck beams barely clear the arches. Ideally we would like to maintain the existing grade line to minimize conflict with adjacent properties. Also, we should attempt to utilize the existing substructure in its entirety without modification. Option 1 satisfies both conditions because the existing and proposed cross sections are identical.

**Option 2: Remove the existing superstructure and replace it with a multi beam, continuous steel superstructure with a conventional cast in place deck.**

If a steel superstructure is built on the existing substructure extensive substructure reconstruction will be required. It may be possible to maintain the current PGL and clear the tops of the old arches if 27 inch deep steel beams are used, but clearance between the beam bottoms and arches will be approximately 2 inches assuming deck fillets are no greater than 1 inch thick. If beam clearance can't be achieved the 6 arches will have to be removed. Each arch weighs 86 tons and removal would have to be done without damaging or destabilizing the piers or abutments.

**Option 3: Completely replace the entire structure.**

The difference in elevation between the low point of the existing PGL and the water elevation for the 500 year flood is 9.7 feet, so freeboard would not be a concern in the design of a replacement structure. A new two span bridge could be built with a construction depth of up to 7 ft. and still clear the water level of this extreme event by over two feet.

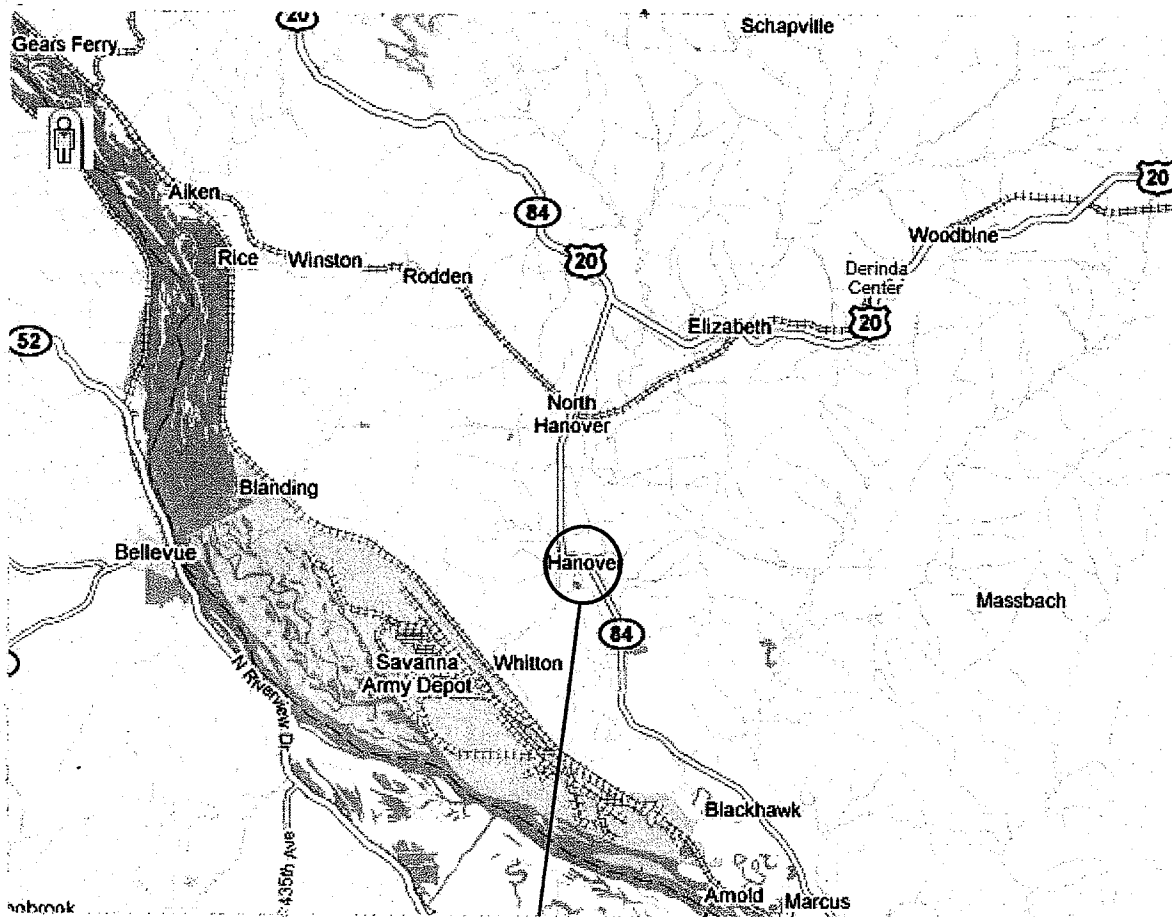
## **V. Discussion and Recommended Scope of Work:**

Complete replacement is the recommended option.

The cost of Option 1 was estimated to be 56% of the cost of a new bridge, but this option was rejected because experience has shown us that deck beam bridges have become very expensive to maintain compared to multi beam bridges with conventional decks. As an example, structure 037-0129 was selected for a cost comparison between these two superstructure types. Structure 037-0129 was built as an entirely new deck beam bridge in 1980. Unit prices for individual pay items were reviewed for that contract, and only items directly related to the construction of the bridge were totaled to get a price per square foot cost. This cost was \$67 in 1980 dollars, and according to the consumer price index, a 1980 dollar would be worth \$2.52 right now. That original \$67 translates to \$168 today. This year we had to replace all of the original beams (contract 64D10) at a current cost of \$63 per square foot. That totals to \$231 per square foot for 28 years of service. The cost of new bridges is currently averaging \$125 to \$145 per square foot of deck surface area.

Option 2 was also rejected. The cost of this option is 82% of the cost of an entirely new structure, and this assumes a new superstructure could be built within the 40 inch gap between the PGL and the tops of the old arches. With option 2 a new superstructure would be built over a 75 year old substructure with nonfunctional arches that restrict inspection access and piers with scaling cover concrete.

# LOCATION MAP



S.N 043-0028

Attachment A.

Illinois Department of Transportation  
Structures Information Management System  
Master Structure Report (S-107)

Structure Number: 043-0028 District: 2

Inventory Data	
Facility Carried: ILL RT 84	Bridge Name: APPLE RIVER
Feature Crossed: 1 OPEN - NO RESTRICT	Status Date: 04/1988
Bridge Remarks: 043 JODAVIESS	Maint Township: 09 HANOVER
Bridge Status: 01 I.D.O.T.	
Status Remarks: 1 HIGHWAY	/ 5 WATERWAY
Maint County: 1 I.D.O.T. - BUREAU OF MAINTENANCE	
Maint Responsibility: 5 PRESTRESS CONCRETE	/ 05 BOX BEAM OR GIRDER-MULTIPLE
Service On/Under: 3 Nbr Of Approach Spans: 0	
Reporting Agency: 3 Nbr Of Main Spans: 0	
Main Span Matl/Type: 0 Ft / 0 None	
Nbr Of Main Spans: 0	
***Approaches***	
Near #1 Matl/Type: 0	
Near #2 Matl/Type: 0	
Far #1 Matl/Type: 0	
Far #2 Matl/Type: 0	
Median Width/Type: 0	
Guardrail Type L/R: 0	
Toll Facility Indicator: 0	
Latitude: 42 D 15 M 29.80 S Longitude: 90 D 17 M 6.55 S	
Deck Structure Type: E PCAST PRES CN DK BM	
Sidewalks Under Structure: 0	
Key Route On Data	
Key Route Nbr: FEDERAL-AID PRIMARY	Station: 004.750
Appurtenances Main Route	Segment: 00.000
Inventory County: 043 JODAVIESS	Linked: Y
Township/Road Dist 09 HANOVER	Natl. Hwy System:
Municipality 2440 HANOVER	Inventory Direction:
Urban Area: None	Curr AADT Yr/Count: 3300
Functional Class: 30 OTHER PRINCIPAL ARTERIAL	Est Truck Percentage:
** CLEARANCES ** South/East North/West	Number Of Lanes:
Max Rdwy Width: 036.0	One Or Two Way:
Horizontal: 041.8	Bypass Length:
Min Vertical: 99Ft 11In	Future AADT Yr/Cnt: 4750
10 Ft Vertical: 99Ft 11In	Designated Truck Rte: CLASS II
Lateral:	Special Systems: Yes
***Marked Route On Data***	
Route #1: 1 Mainline	Kind: State Highway
Route #2:	
Route #3:	
Key Route Under Data	
Station:	
Segment:	
Linked:	
Natl. Hwy System:	
Inventory Direction:	
Curr AADT Yr/Count:	
Est Truck Percentage:	
Number Of Lanes:	
One Or Two Way:	
Bypass Length:	
Future AADT Yr/Cnt:	
Designated Truck Rte:	
Special Systems:	
***Marked Route Under Data***	
Designation	Kind
Number	



**Structure Number: 043-0028**

<b>Maint. Co:</b>	<u>JODAVIESS</u>	<b>Twsp:</b>	<u>HANOVER</u>	<b>Status:</b>	<u>OPEN - NO RESTRICT</u>
<b>Facility Carried:</b>	<u>ILL RT 84</u>	<b>Feature Crossed:</b>	<u>APPLE RIVER</u>	<b>Team/Sub</b>	
<b>Location:</b>	<u>IN HANOVER</u>	<b>Municipality:</b>	<u>HANOVER</u>	<b>Section</b>	
<b>Total # Spans:</b>	<u>3</u>	<b>Material:</b>	<u>PRESTRESS CONCRETE</u>	<b>Type:</b>	<u>BOX BEAM OR GIRDER-MULTIPLE</u>
<b>Inspection Intervals (Mo.):</b>	<u>Routine NBIS</u>	<u>12</u>	<b>Fracture Critical</b>	<u>0</u>	<b>Underwater -</b> <u>0</u>

BBS-BIR-2 (Rev. 10/01)  
Sheet 1 of 2



## Element Level Field Inspection Report

SN: 0430028 District: 2 Spans: 3 Appr. Spans: 0 Skew: 00 ADT: 3300 Truck Pct: 8 ADT Un: 0

Facility Carried: ILL RT 84

Name:

Feature Crossed: APPLE RIVER

Location: IN HANOVER

Inspection Date: 10/26/2007

Inspection Notes:

Inspector 1: MARDAUSSRW

Inspector 2:

Temp: 60

### Resources

Time to Insp:	1:00	Trffc Ctrl:	1	Boat:	B	Waders:		Snooper:	
		Ladder:		Manlift:		Other:			

### Inspector's Appraisals

Elem	Element Desc	Env	Quantity	Un	CS1	CS2	CS3	CS4	CS5
22	Concrete Deck Protected w/ Rigid Overlay	2	8820	SF	8820	0	0	0	0
	Remarks:								
104	P/S Conc Closed Web/Box Girder	2	2940	LF	2940	0	0	0	0
	Remarks:								
108	Keyway	2	2730	LF	1957	773	0	0	0
	Remarks:								
210	Reinforced Conc Pier Wall	1	6442	SF	5982	200	260	0	0
	Remarks:								
215	Reinforced Conc Abutment	1	4499	SF	4404	45	50	0	0
	Remarks:								
234	Reinforced Conc Pier or Abutment Cap	1	176	LF	152	9	15	0	0
	Remarks:								



## Element Level Field Inspection Report

SN: 0430028 District: 2 Spans: 3 Appr. Spans: 0 Skew: 00 ADT: 3300 Truck Pct: 8 ADT Un: 0

308	Continuous Seal Neoprene Expansion Joint	2	120	LF	87	33	0	0	0
Remarks:									
321	Reinforced Concrete Approach Slab	2	1365	SF	1365	0	0	0	0
Remarks:									
323	Approach Pavement	2	2	EA	2	0	0	0	0
Remarks:									
331	Concrete Bridge Railing	2	554	LF	554	0	0	0	0
Remarks:									

Inspected By: \_\_\_\_\_